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10/644,786	08/21/2003	Phil MacPhail	115-31US/12667/100113	6922

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EXAMINER

WHITTINGTON, KENNETH

ART UNIT PAPER NUMBER

2862

DATE MAILED: 08/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/644,786	<b>Applicant(s)</b> MACPHAIL ET AL.	
	<b>Examiner</b> Kenneth J. Whittington	<b>Art Unit</b> 2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.


#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

  
Bot Ledynh  
Primary Examiner

#### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign mentioned in the description: 110 on page 3,  
6 paragraph 0015.

Figures 1, 2 and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

12 The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the coil being on the same substrate as the integrated circuit as recited in claims 5 and 17, the coil being on a second substrate from the integrated circuit as recited in claims 6 and 18, and multiple coils having varying  
18 orientations as recited in claims 7, 8, 19 and 20 must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment

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of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

18

### *Specification*

Applicant is reminded of the proper language and format for an abstract of the disclosure.

24. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the

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abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because it contains a phrase that can be implied, i.e.. "is disclosed" on line 2. Correction is required. See MPEP § 608.01(b).

18

### *Claim Objections*

Claim 13 is objected to because of the following informalities: "the integrate circuit" on line 5 lacks antecedent basis. This phrase should be "the integrated circuit". Appropriate correction is required.

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### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

30

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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Claims 1, 2, 4-6, 13, 14 and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Vernon et al. (US 6,268,725).

Regarding claims 1 and 13, Vernon et al. discloses an apparatus and method for a magnetic field measuring device comprising:

a coil comprising a core and a pair of contacts (See Vernon et al. col. 4, lines 24-28 and note illustrative embodiment in FIG. 4, particularly the two contacts, one above and one to ground), the core for alternating between a first magnetically saturated state and a second magnetically saturated state in response to a time-varying current signal applied to the contacts and an external magnetic field, the second magnetically saturated state having an opposite polarity to the first magnetically saturated state (See col. 4, line 1 to col. 5, line 60); and

an integrated circuit comprising two contacts and disposed on a substrate (See circuitry shown in FIGS. 1-4 associated with the sensor and see col. 4, lines 37-40), the contacts of the integrated circuit electrically coupled to the contacts of the coil, the two contacts of the integrated circuit both for providing the time-varying current signal and for receiving a

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time-varying voltage signal (See same portions of Vernon et al.), the time-varying voltage signal having a duty cycle dependant upon an orientation of the coil relative to the external magnetic field (See col. 6, lines 28-31).

Regarding claims 2, 4, 14 and 16, Vernon et al. discloses  
6 the time-varying current signal is a triangular wave current signal generated using a triangular wave generator (See FIGS. 1-4 and col. 4, lines 51-65, note drive signal generator forming triangular waveforms).

Regarding claims 5, 6, 17 and 18, Vernon et al. discloses  
12 that the sensor portion may be located on the chip with the other circuitry of the magnetometer or it may be located off chip from the circuitry (See col. 4, lines 37-41).

Claims 9-12 are rejected under 35 U.S.C. 102(b) as being  
anticipated by Kurihara et al. (US 5,757,184). Regarding claim  
9, Kurihara et al. discloses a method for determining a magnetic  
18 field comprising:

using an integrated circuit to provide a current signal to a coil via a pair of contacts (See circuit shown in Kurihara et al. FIG. 10, note also two contacts to coil shown in FIG. 5 and see col. 6, lines 10-11), the coil comprising a core (See FIG. 5, item 1);

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monitoring a voltage potential between the pair of contacts  
(See circuit shown in FIG. 10);

determining a duty cycle associated with a first  
electromagnetic saturation of the core, and a second  
electromagnetic saturation of the core, the second  
6 electromagnetic saturation of the core having an opposite  
polarity to the first electromagnetic saturation (See FIGS. 5-9  
and col. 6, line 56 to col. 9, line 2); and

determining a direction based upon characteristics of the  
current signal, and the duty cycle (See col. 8, line 66 to col.  
9, line 2 and col. 1, lines 15-19).

12 Regarding claim 10, the integrated circuit provides a  
triangular output signal (See col. 9, lines 32-41).

Regarding claims 11 and 12, the integrated circuit monitors  
the voltage potential (See FIGS. 5-9 and col. 6, line 56 to col.  
9, line 2).

18 ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which  
forms the basis for all obviousness rejections set forth in this  
Office action:

24 (a) A patent may not be obtained though the invention is not identically  
disclosed or described as set forth in section 102 of this title, if the  
differences between the subject matter sought to be patented and the prior  
art are such that the subject matter as a whole would have been obvious at



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the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere*

6 Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for  
establishing a background for determining obviousness under 35  
U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
- 12 3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 4-8, 13, 14, 16-20 are rejected under 35  
18 U.S.C. 103(a) as being unpatentable over Kurihara et al. in view  
of Vernon et al. Regarding claims 1, 5, 6, 13, 17 and 18,  
Kurihara et al. discloses a geomagnetism sensor comprising:

a coil comprising a core and a pair of contacts (See  
Kurihara et al. FIG. 5, note two contacts to coil shown and  
core), the core for alternating between a first magnetically  
24 saturated state and a second magnetically saturated state in  
response to a time-varying current signal applied to the  
contacts and an external magnetic field, the second magnetically  
saturated state having an opposite polarity to the first  
magnetically saturated state (See FIGS. 5-9 and col. 6, line 56  
to col. 9, line 2); and

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an integrated circuit comprising two contacts (See circuitry shown in FIG. 10 associated with the sensor and see col. 9, line 6 to col. 11, line 23), the contacts of the integrated circuit electrically coupled to the contacts of the coil, the two contacts of the integrated circuit both for providing the time-varying current signal and for receiving a time-varying voltage signal (See FIG. 10, note connection and see same paragraphs), the time-varying voltage signal having a duty cycle dependant upon an orientation of the coil relative to the external magnetic field (See col. 8, line 66 to col. 9, line 2 and col. 1, lines 15-19).

However, Kurihara et al. does not explicitly teach the arrangement of the magnetometer with regard to a substrate. Vernon et al. teaches that magnetometers can be arranged on a chip such that either the sensor portion including the coil and core are located either on the same chip or located off chip on a separate substrate (See Vernon et al. col. 4, lines 37-41).

It would have been obvious at the time the invention was made to incorporate the circuitry onto a chip (substrate) and to either have the sensor portion on the same chip or another chip from the circuitry. One having ordinary skill in the art would have been motivated to place the components on a substrate or chip to provide a stable platform onto which to assemble and connect the

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various circuit components and further one having ordinary skill in the art would be motivated to either place the sensor on a separate substrate or the same substrate as the other circuitry because such arrangements are art recognized equivalents for measuring magnetic fields as recognized by Vernon et al. (see 6 same paragraphs).

Regarding claims 2, 4, 14 and 16, Kurihara et al. discloses the time-varying current signal is a triangular wave current signal generated using a triangular wave generator (See Kurihara et al. col. 9, lines 32-41).

Regarding claims 7 and 19, Kurihara et al. teaches a second 12 coil, the second coil comprising a second core and a second pair of contacts (See Kurihara et al. FIG. 19, item 41y), the second core for alternating between a third magnetically saturated state and a fourth magnetically saturated state in response to a time-varying current signal applied to the second pair of contacts and the external magnetic field, the fourth 18 magnetically saturated state having an opposite polarity to the third magnetically saturated state, the second coil disposed at a substantially non-zero angle relative to the first coil (See col. 14, line 11 to col. 18, line 60).

Regarding claims 8 and 20, Kurihara et al. teaches a third coil, the third coil comprising a third core and a third pair of

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contacts (See Kurihara et al. FIG. 19, item 41z), the third core for alternating between a fifth magnetically saturated state and a sixth magnetically saturated state in response to a time-varying current signal applied to the third pair of contacts and the external magnetic field, the sixth magnetically saturated  
6 state having an opposite polarity to the fifth magnetically saturated state, the third coil disposed at a substantially non-zero angle relative to both the first coil and the second coil (See col. 14, line 11 to col. 18, line 60).

Claims 3 and 15 are rejected under 35 U.S.C. 103(a) as  
12 being unpatentable over Kurihara et al. in view of Vernon et al. as applied to claims 1 and 13 above, and further in view of Kawahito et al. (A 2-D CMOS Microfluxgate Sensor System for Digital Detection of Weak Magnetic fields). Kurihara et al. in view of Vernon et al. teaches the features of claims 1 and 13 as discussed above. Further, this combination teaches using a  
18 triangular wave generator (See Kurihara et al. col. 9, lines 32-41). However, this combination does not teach a square wave to triangular wave converter. Kawahito et al. teaches applying a triangular wave form to a coil in a fluxgate sensor using a square to triangular wave generator (See FIG. 8 on page 1847). It would have been obvious to use the square to triangular wave

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converter as the triangular wave generator in the noted combination. One having ordinary skill in the art would have been motivated to do so to create a consistent triangular signal wave-form based on a digital clock signal (See Kawahito et al. page 1848).

6

### *Conclusion*

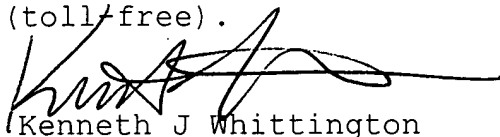
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure as relating to various designs for geomagnetic fluxgate sensors and methods of operating therefor.

12 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are  
18 unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kenneth J Whittington  
Examiner  
Art Unit 2862